TABLE 1

FREQUENCY AND OR DURATION OF VARIOUS BEHAVIOURAL ACTIVITIES OF *Golunda ellioti* ON THE ECLIPSE DAY

Activity	Mean frequency/duration of activity		Level of probability
	normal day	eclipse day	
Jumps on the cage wall	7.0 ± 1.50	2.63 ± 0.92	$P < 0.02$
Exploration (upright postures)	9.63 ± 1.45	2.20 ± 0.67	$P < 0.001$
Movements in the cage	5.22 ± 0.79	1.70 ± 0.60	$P < 0.001$
Total duration of feeding (in sec.)	27.99±10.64	37.27 ± 14.00	(NS)
Grooming (in numbers)	2.15 ± 0.33	1.13 ± 0.31	$P < 0.05$
Huddling (in min.)	2.36 ± 1.20	9.03 ± 1.74	$P < 0.01$

their huddling behaviour which on the eclipse day increased considerably ($P < 0.01$). It was observed at 2.15 p.m.; prior to the beginning of eclipse and after 3.15 p.m. huddling gradually increased and interestingly from 3.45 p.m., the greatest phase of the eclipse, to 5 p.m. the animals remained huddled over one another in the corner of the cage, almost without performing any vital activity. Such a behaviour was not observed on earlier days. During the maximum phase of eclipse (3.30-3.45 p.m.) in contrast to decline in other activities, grooming was performed at a higher frequency and faster rate (Fig. 1).

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It is interesting to observe that only *G. e. gujerati* behaved in a different manner during eclipse whereas there was no apparent change in any other rodent species.

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3. APPARENT ALLOMATERNAL CARE IN AN INSECTIVOROUS BAT *HIPPOSIDEROS SPEORIS*

Analyses of mother-infant relations pave the way for a better understanding the extent of social organization in bats (Bradbury 1977). The process of mother-infant relationship becomes a little complex in the case of bats, since their food and feeding habits necessitate long foraging sojourns away from the roost every night. Hence in most cases the mothers leave

behind their young ones in the roost and retrieve them only on return from foraging, implying that the mothers recognize their own infants individually (Gould 1971). Studies on one of the microchiropteran species *Hipposideros speoris* living in a cave near Madurai (9°58'N. 78°10'E.) revealed that the mothers recognized and retrieved only their own respective infants by acoustical and olfactory means (unpublished observations).

We observed two off-beat and unusual phenomena on two occasions in the course of our experiments with captive bats reared in laboratory cages and in an outdoor flight chamber. We consider that such phenomena resemble some kind of allomaternal care as defined by Wilson (1975). On the first occasion, a volant young male was seen clinging to as well as suckling from an adult female which had experienced a stillbirth on the previous day. This was observed to happen for two consecutive days at early morning hours in our laboratory cages (50×50×50 cm) maintained for the purpose of study on spatial memory in these bats. The position of the young bat clinging to the ventral surface of the female was upside down as in normal cases.

The second phenomenon was observed in an outdoor flight chamber (26'×12'×15') in the course of our experiments on mother/infant relationship. Five pregnant females were caught on 4-11-80 which gave birth while being reared in the cage. *Hipposideros speoris* is a continuous breeder. These were individually marked with different coloured celluloid split rings before being released into the outdoor cage. The temperature (27°C) and humidity (95%) conditions of the cave were simulated to a certain extent by constructing a thatched roof over the top and by maintaining a pool of water inside the flight cage. During day hours the animals retreated into the darker recesses of the cage and after sunset flew around actively foraging on the insects that were attracted to the fluorescent light fitted inside the cage.

The bats survived well under these conditions and gave birth to young ones within 1-25 days of capture. As was observed in the cave, in our captive conditions also, the bats left the infants behind while foraging, visited them at random during the night hours and retrieved them only at early morning hours. The process of a rigid mother/infant bond was also observed in these animals for many days, until on 1.12.80 mother No. 3 was seen carrying two young bats, one (a 20-day male) it's own and the other (a 25-day female) originally the offspring of mother No. 1. Though the actual retrieval of these two young by the female was not observed directly, we sighted mother No. 3 carrying both the young ones at 0400 h in the morning. Though at first the young ones were found clinging one over the other on to the ventral surface of the female, later they hung side by side. Mother No. 3 carried both the young bats till 0502 h when it deposited both the infants on the roost wall and continued foraging. Though mother No. 1 —the mother of the female infant stopped foraging and settled down for roosting, *c* 1 metre from its infant, she did not show any visible sign of recovering the infant, which was seen to emit continually faint audible vocalizations at the mother. The mother responded finally only at 0740 h and as soon as the infant joined the mother, it started to suckle. Similarly mother No. 3 also retrieved it's baby only at 0930 h.

We conclude that the mothers do not voluntarily seek out other infants for nursing directly, even though they do not reject the stray infants that somehow manage to reach them. However these bats differ from *Rhinopoma hardwickei* in which the mothers do not

even accept their own infants after an experimental separation and they go to the extent of active rejection by attacking their own infants thus experimentally separated. Adoptions in the true sense are not uncommon in a few social animal groups such as primates (Poirier 1968), elephants (M. Gadgil, personal communication) and lions (Schaller 1972). In a microchiropteran bat *Myotis thysanodes* communal raising of young ones and the presence of guardian females have been reported (O'Farrell and Studier 1973). Indiscriminate nursing was noticed in the mexican free-tailed bat, *Tadarida basiliensis mexicana* by Davis *et al.* (1962). Recently Porter (1979) reported that the harem males of leaf-nosed bat *C. perspicillata* guard the infants during night hours and chase the mothers until they reunite with their young ones. Since we have not noticed any comparable apparent adoption in any of the 7 species of microchiropteran bats in and around Madurai as we report here for *H. speoris*, we do not wish to rule out the possibility that this behaviour might eventually express itself only under stress or as an artifact under captive conditions. If such apparent tolerance of mothers to stray young ones is manifested in the natural environment also, it is of adaptive value in the sense that in an eventuality of mothers getting killed the orphaned infants could survive by the grade of 'adoption'.

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